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ABSTRACT

This paper reviews the research on cooperative learning combined with technology and presents a formative report of those findings. The review focused on these questions: What are the benefits of cooperative learning in a multimedia environment? What benefits do computer-based training offer? What are the benefits of cooperative learning integrated into computer-based training? The research for this study was conducted by using several online resources of the Morris Library at Southern Illinois University, University of Central Florida's library, and books at the Seminole County Public Library. The majority of the resources were accessed from the ERIC System. There were only a few printed books that were used. The following conclusions are offered: (1) Students learn together in groups so that they can perform better as individuals; cooperative learning reinforces learning; and the students believe they "sink or swim together." (2) With its convenience of access, computer-based training may provide insight into which instructional strategies are most effective for different types of learners. (3) Of the three methods of computer-based instruction-individual, collaborative, and cooperative-cooperative, computer-based instruction appears to be the most effective (Sparks & Simonson, 2000); by using the five elements of cooperative learning, computer-based instruction can be used to enhance learning. (4) Cooperative learning activities centered on the computer and the Internet could be organized to effect interaction and solve some of the teaching-learning problems in schools; because learning takes place when information is shared, cooperative learning can be advantageous to all learners. (5) Cooperative learning methods coupled with the flexibility of CBT, holds great promise for accelerating students' attainment of high academic standards. Recommendations are offered at the end of the paper. (Contains 18 references.) (AEF)

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BENEFITS OF COOPERATIVE LEARNING IN A MULTIMEDIA ENVIRONMENT

by

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B.S., Southern Illinois University, 2000

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CHAPTER I

INTRODUCTION

Need for the Study

John Dewey, "The Father of Education", had no idea how far his research studies, and educational theories would propel education. Noted for his ideas in education, he had the most modern approach to learning. That is until the first books on cooperative learning was written by Maller, Mead, May and Dobb (Johnson, Johnson & Smith, 1998). Although the concept of effective cooperative learning was primitive, those authors stumbled onto a prevailing way of learning. That concept of cooperative learning is achieved by forming small groups to accomplish a common learning goal (Johnson et al. 1998).

Since the early 1900s cooperative learning and forming small groups of students for learning has been studied, researched, and evaluated. Because of that research, new heights of achievement have been reached. Studies show that the benefits of students working collaboratively in small groups yielded considerable academic achievement as well as significant social skills (Slavin, 1985). The achievements of students working in small groups and technology giving birth to the computer, moved research on cooperative learning in several directions, peer coaching, mainstreaming, teacher collaboration, and computer-based training (Madden, Slavin, Karweit, & Liverman, 1989). Was computer-based training a more intuitive, more efficient, more flexible means of distributing education?

With the introduction of technology, by the end of the 20th Century, educators researched the effects of cooperative learning coupled with multimedia tools. Studies

explored the effects of cooperative learning in computer-based training. Can computer-based training be incorporated into cooperative learning and, if so, what are the benefits of computer-based training integrated into cooperative learning? This paper reviews the research on cooperative learning combined with technology and presents a formative report of those findings.

Purpose of the Study

The purpose of the study was to review and synthesize the literature and research on the benefits of cooperative learning coupled with the flexibility of computer-based training. Students benefit from the cooperative learning design, coupled with the integration of computer-based training, by not only increasing the likelihood that academic/technical learning takes place during training, but also by offering the added bonus of reinforcing human interaction skills.

This information may be useful to educators, trainers, and students who have questions about cooperative learning, computer-based training, and the interaction of the two learning tools.

Statement of the Problem

The problem of this statement was: What are the benefits of cooperative learning in a multimedia environment?

Research Questions

1. What are benefits of cooperative learning?
2. What benefits do computer-based training offer?

3. What are benefits of cooperative learning integrated into computer-based training?

Delimitations / Limitations

This study is delimited to a review and synthesis of available literature. and not qualitative research using any survey instrument or person. The writer is a trainer who facilitates Cooperative Learning in Train the Trainer classes. However, because the writer did not participate in any surveys or original research, all correspondence should be directed to the Cooperative Learning Center at the University of Minnesota, the center for extensive research, knowledge and experience in Cooperative Learning.

Definition of Terms

Cooperative Learning: An instructional approach to learning that encourages interaction between and among two or more learners to maximize their own and each other's learning (Hsi & Agogino, 1995).

Multimedia Environment: The educational setting that usually refers to computer programs that use a combination of sound, video, animation, pictures, and/or text (Hsi & Agogino, 1995).

Computer-based Training (CBT): Learning mediated through the use of computers where the computer is used as a tool to facilitate learning.

CHAPTER II

REVIEW OF LITERATURE AND RESEARCH

Introduction

The purpose of this study was to review and synthesize the literature an research on the benefits of cooperative learning coupled with the flexibility of computer-based training. Computer Assisted Learning (CAL) has a long tradition going back to the late 1950s and early 1960s. The popularity of the Internet and the World Wide Web has injected a new lease on life into CAL (O'Shea & Self, 1983).

This research paper will review and summarize the benefits of Cooperative Learning and Computer-Based Training.

Method

The research for this study was conducted by using several online resources of the Morris Library at Southern Illinois University, University of Central Florida's library, and books at the Seminole County Public Library. The majority of the resources were accessed from the ERIC System. The ERIC System's FirstSearch yielded only a few options under the field of "cooperative learning in a multimedia environment;" therefore, the search had to be broken down into two fields to access the highest number of resources. The search was broken down into these two key word phrases: *computer-based learning* and *cooperative learning*. This source yielded several different records, of which a number were related to either cooperative learning or computer-based learning. A selective process of analyzing titles of resources and then reading the

abstracts had to be accomplished. After weeding out the resources that could not be used, a list of usable material was printed out.

There were only a few printed books that were used. Having attended the Cooperative Learning Strategies Training (2001) hosted by the authors of several cooperative learning methods, learning strategies, and learning styles at the Cooperative Learning Center at the University of Minnesota, their printed copies on the subject was used.

Cooperative Learning

Research Question 1: What are benefits of cooperative learning?

Johnson, Johnson & Smith (1998) defined cooperation as working together to accomplish shared goals. While working in cooperative groups, all students' benefit by working toward shared goals. They went on to define cooperative learning as the instructional use of small groups so that students work together to maximize their own and each other's learning (Johnson et al. 1998). There are five elements in cooperative learning that distinguish it from conventional learning.

The five elements of cooperative learning according to Johnson et al. (1998) are Positive Interdependence, Individual Accountability, Group Processing, Social Skills, and Face-to-Face Interaction. It is these five elements that make cooperative learning work so well and differentiate it from just groups working together. For years many teachers, instructors, and facilitators have been using groups to teach, ineffectively, without these five elements. Without these five elements there would be no continuous learning success. What makes these five elements so special is that they intertwine with each other to form a web of success. Each student benefits from the knowledge and

experiences of the other group member's knowledge and experiences, both academically and socially.

Positive Interdependence

The first and most important element is Positive Interdependence (Johnson, Johnson, & Holubec, 1994). In this element, responsibility for the group and the individual is structured into the lesson or subject. The authors stated that you must give a clear task and a group goal so that students believe they "sink or swim together". Group members realize that their efforts benefit the group and not just him-or-herself. In turn, group members benefit by knowing that they are a part of the whole. "If there is no positive interdependence, there is no cooperation" (p. 1 : 9).

Individual Accountability

The second essential element of cooperative learning is Individual and Group Accountability (Johnson, Johnson, & Holubec, 1994). This element teaches the students to perform higher as individuals by learning as a team. The authors believe that the group has to be clear about its goals and be able to measure (a) its progress in achieving them, and (b) the individual efforts of each of its members. Individual accountability exists when the performance of each individual student is assessed and the results are given back to the group and the individual in order to ascertain who needs more assistance, support, and encouragement in completing the assignment (Johnson et al. 1994). In this element students assess themselves and give feedback, which benefit the students by being able to see where improvement is needed.

Group Processing

The third essential component of cooperative learning is Group Processing (Johnson, Johnson, & Holubec, 1994). In this element, group processing exists when group members discuss how well they are achieving their goals and maintaining effective working relationships. Continuous improvement of the process of learning results from the careful analysis of how members are working together and determining how group effectiveness can be enhanced (Johnson et al. 1994). By group processing, members can then see how to improve their group cohesiveness.

Social Skills

The fourth essential element, according to the Johnson, Johnson & Holubec (1994), is teaching students the required interpersonal and small group skills necessary for cooperative learning. To accomplish this, these skills, interpersonal and group skills, must be used to effectively work with others. The Johnson et al. (1994) found the following:

> Group members must know how to provide effective leadership, decision-making, trust building, communication and conflict-management, and be motivated to use the prerequisite skills. Since cooperation and conflict are inherently related, the procedures and skills for managing conflicts constructively are especially important for the long-term success of learning groups. (p. 1 : 10)

Consequently, students learn how to effectively work with diversity.

Face-to-Face Interaction

The fifth essential component of cooperative learning is Face-to-Face Promotive Interaction (Johnson, Johnson, & Holubec, 1994). In this element students do real work together, sharing resources and helping, supporting, encouraging, and praising each other's efforts to learn. By this interaction, they promote each other's success. The Johnson et al. (1994) stated:

> There are important cognitive activities and interpersonal dynamics that can only occur when students promote each other's learning. This includes orally explaining how to solve problems, discussing the nature of the concepts being learned, teaching one's knowledge to classmates, and connecting present with past learning. It is through promoting each other's learning face-to-face that members become personally committed to each other as well as to their mutual goals. Students can benefit not only by seeing how others got their answers but by what thought process did they obtain it. This increases the critical thinking process of the group. (p. 1 : 11)

Without the hard work required to apply these elements, cooperative learning would not be effective. It is a learning style that can be used in many different situations and with various learning aptitudes of students. The Johnson et al. (1998) study investigated the subject matter of different types of students' learning styles. Meyers and Jones (1993) wrote, "Cooperative learning fosters exercises that require students to talk and listen, to write, to read, and to reflect on what is being studied rather than listen passively to a lecture" (p. 20).

Conducting over 600 experimental studies, the Johnson et al. (1993), declared that cooperation, compared to competition and individualistic efforts, typically results in (a) higher achievement and greater productivity, (b) more caring, supportive, and committed relationships, and (c) greater psychological health, social competence, and self-esteem. Research also suggests that collaborative learning increases student motivation an achievement, promotes greater use of higher-level reasoning strategies and critical thinking, creates a sense of social cohesion an creates a productive learning environment (Abrami, 1995).

Computer-Based Training

Research Question 2: What benefits do computer-based learning offer?

In 1997, papers presented during the Computer Assisted Learning Conference at Exeter (University of Exeter, 1998), could be categorized into three different ways of looking at how computers can assist in learning:

- Supporting and enhancing the teaching and learning already present.
- A technology led, limited system applying to one aspect of teaching and learning.
- Providing a unique way of solving a teaching and learning problem.

The third approach to computer assisted learning, that of identifying a teaching or learning problem and looking at the technology for a possible solution, was by far, the most popular approach to computer assisted learning (University of Exeter, 1998).

In a research study conducted by Harasim (1987) on online graduate courses in education, the following benefits of CBT were identified:

- Increased interactions, quality and intensity
- Better access to group knowledge and support

- More democratic environment
- Convenience of access
- Increased motivation

As one can surmise, clearly there are many benefits in Computer-Supported Learning, though context and purpose are key issues relating to successful outcomes (University of Exeter, 1998).

One experiment, conducted by the University of Exeter (1998), was to observe the cooperative learning already taking place in a computer science degree course using project-based teamwork over the Internet, entitled Project 2 these key issues of context and purpose were illustrated by:

- the fact that this was a distance learning module and this was the only medium by which the students were able to communicate,
- the nature and subject of the course content were completely relevant to the use of this medium (computer-assisted learning),
- computer-mediated communication was entirely appropriate for the approach and design of the course which incorporated the need for cooperation, exploration and construction. (p. 10)

Another advantage of Computer-Based Training is that computer technology can be more appealing to the students compared to the traditional way of learning. Maushak (1998) research found:

> The medium of exchange in computer conferencing encourages online discussion and fosters collaborative learning. Research comparing one of the benefits of

cooperative learning, face-to-face interaction, with online collaboration, yielded that "online interactions share many characteristics with face-to-face education" (p. 304).

Because the face-to-face environments do not exist in real time, students have to think about what is said and their response, so they adapted their textual communications to become more descriptive, detailed, and reflective. Researchers suggest that the very nature of computer conferencing-its capacity to support interaction between and among students and teachers-fosters a collaborative approach to learning (Maushak, 1998).

Computer-Based Cooperative Learning

Research Question 3: What are benefits of cooperative learning integrated into computer-based training?

Different tools have been developed to facilitate students' cooperation and collaborative leaning. One researcher (Dede, 1996) has shown how very different technical applications can be used to facilitate collaborative and distributed teaching and learning, including special network applications for computer-supported cooperative learning, different multimedia/hypermedia applications and experiential simulations.

Johnson et al. (1993) identified if the cooperative learning design, coupled with the integration of computer-based training, would not only increase the likelihood that academic/technical learning will take place during training, but also offer the added bonus of reinforcing human interaction skills. They surmised that, "Simply placing students near each other and allowing interaction to take place does not mean that learning will be maximized, high quality peer relationships will result, or student psychological adjustment, self-esteem, and social competencies will be maximized"

(p. 3 : 11). Hence, it can only work effectively with the aforementioned five elements of cooperative learning.

Sparks and Simonson (2000) found that there were numerous positive influences of computers and cooperative learning. In their research of student dyads using computer-based instruction and trained in cooperative learning techniques, the authors found that individual student learning gains were statistically significant compared to than those students who received the computer-based instruction in an individualized setting.

Klein and Cavalier (1999) conducted a research to evaluate the effects of a cooperative version of the CBT incorporating three of five of the elements of cooperative learning; positive interdependence, face-to-face interaction, and individual accountability, as stated by Johnson et al. (1998). The study reported objectives incorporated into the lesson plan enhanced learning of intentional or test-related content. The study further reported that the learning strategies did not influence performance or attitude, but that results revealed individuals spent significantly more time on the CBT than conventional learning (Klein & Cavalier, 1999).

A review of the literature and research showed that several others completed many different studies to show the effectiveness of cooperative learning integrated into computer-based training. Brush's (1995) study revealed that students using an Integrated Learning System for mathematics performed better on standardized tests when they completed the computer activities in cooperative groups. Dede (1996) claim:

> Computer-supported collaborative learning enhances team performance through tools for communicating each person's ideas, structuring group dialogue and

decision making, recording the rationales for choices and facilitating collective activities…such tele-presence enables mentoring across distance and provides a social context that reinforces and motivates learning, in addition to preparing students for telecommuting roles in the business environment (p. 13).

Summary

Summary of Literature and Research

1. Literature and research reflect how the five benefits of cooperative learning were implemented into learning strategies with computer aid. It was revealed that cooperative learning could be incorporated into different learning strategies and yield highly effective results.
2. Computer flexibility was also found to be appealing to all students in all manners of learning strategies.
3. Cooperative learning increases student motivation an achievement, enhances critical thinking, fosters social skills, and creates a productive learning environment.
4. By doing research on cooperative learning and the use of technology, educators have shown a different approach to opening more avenues for more effective learning.
5. Although just over a decade of research was done on cooperative learning and multimedia aided instruction, researchers have found this learning strategy to be highly effective.

CHAPTER III

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of the study was to review and synthesize the literature and research on the benefits of cooperative learning coupled with the flexibility of computer-based training. The research was to identify the benefits of cooperative learning, the benefits of computer-based learning, and if cooperative learning could be integrated into Computer-based learning.

What are benefits of cooperative learning?

A review of the literature did indicate the benefits of cooperative learning. A majority of the research completed on cooperative learning expressed that cooperative learning resulted in higher achievement and greater productivity among students. Several other researchers noted that the social and psychological attitudes were more positive. By students feeling that they are a part of a bigger whole and the group is incomplete without them, they commit to the task at hand. Research also showed that student's confidence increased when learning in groups and interacting socially with different students. In addition, literature indicated students also performed better on tests when they completed activities in cooperative groups.

What benefits do computer-based learning offer?

As the literature review indicates, training with computers has many benefits. Because this is the age of computer technology, the visual aspects of computer-based training can be more appealing to students compared to traditional learning. Review of

the literature also explained how the computer could increase group knowledge because it can connect many learners over great distances learning simultaneously. This type of computer conferencing encourages online discussion and fosters collaborative learning.

What are benefits of cooperative learning integrated into computer-based training?

And finally, the literature review did indicate there were many positive benefits of computer-based cooperative learning. There was an increase in time spent on the computer compared to conventional learning. Not only did the literature review illustrate that computer-based cooperative learning enhanced team performance, but also showed increased group dialogue and critical thinking skills by having to explain how group members derived on an answer. Overall, the benefits of computer-based cooperative learning are increased retention, transfer of knowledge from group to individual, increased confidence, more positive attitude toward the subject matter, and maximized learning.

Conclusions

1. Cooperative Learning was researched and it was found that students learn together in groups so that they can perform better as individuals. Cooperative Learning reinforces learning and the students believe they "sink or swim together."
2. With its convenience of access, computer-based training may provide insight into which instructional strategies are most effective for different types of learners.

3. Of the three methods of computer-based instruction-individual, collaborative, and cooperative-cooperative, computer-based instruction appears to be the most effective (Sparks & Simonson, 2000). By using the five elements of cooperative learning, computer-based instruction can be used to enhance learning.
4. Research showed how cooperative learning activities centered on the computer and the Internet could be organized to effect interaction and solve some of the teaching-learning problems in schools. Because learning takes place when information is shared, cooperative learning can be advantageous to all learners.
5. Cooperative-learning methods coupled with the flexibility of CBT, holds great promise for accelerating students' attainment of high academic standards.

Recommendations

1. The concept of cooperative learning is relatively new and studies are still ongoing, so it is recommended that further studies be conducted on cooperative learning integrated into computer-based learning.
2. It is recommended that further research be conducted on:
    (a) Learning styles on multimedia cooperative learning, and the many different styles of learning. As technology tends to evolve, we need to take advantage of the rapid moving trends and integrate technology into the learning styles to further advance education to benefit all learners.

(b) The benefits of students working collaboratively in small groups yield considerable academic achievement as well as significant social skills.

3. Active learning, collaborative learning, web-based instructions, and cooperative learning methods should be considered while teaching in a multimedia environment.

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